Renewable Energy for Protected Areas in Mexico

Location: Southern Mexico (Chiapas, Oaxaca, Quintana Roo)
Type: Distributed photovoltaic (PV) and wind applications
Size: 75 independent stand-alone systems, ranging from 50 to 11.2 kW
Funding: Total: US$900,000
Private (in-kind): US$300,000
Public sources: US$600,000
Objective: To use renewable energy technology in remote, protected areas.
Duration: 1994–2000
Scale: Rural

Summary

This program successfully demonstrated the role that renewable energy technologies can play in managing protected areas and developing buffer zone communities throughout southern Mexico. As a result, international and local nongovernmental organization (NGO) partners are now including energy considerations in their planning activities, and they have the capability to decide when clean energy technologies can help to meet these needs. The approach has stimulated improvements in field research capabilities, improved quality of life for reserve rangers and guards, and enhanced environmentally friendly economic development throughout Mexico.

In-Country Principles That Attracted Nondonor Financing

- Capacity building and informed decision making
- Public participation in, and support of, sustainable development
- Institution building and access to justice and enforcement of laws

Capacity-building activities that helped enable the success of the partnerships included awareness and educational workshops for decision makers, skills-oriented training for decision makers and staff, study tours, stakeholder partnerships and exchanges, dissemination of best practices, and participation in international forums and workshops.

Programs in professional training, public education and communication, and outreach have helped increase public knowledge of, and participation in, energy decision making.

The definition and creation of competitive and captive markets also helped to improve institutions.

The Mexican Environment Secretariat has maintained a strong mandate to manage activities related to the protection of the environment. The success of this project comes largely from the strength of this government office and the high value that it places on partnerships with NGOs and the private sector.

Financing

Total capital costs were approximately US$600,000. In-kind contributions from conservation organizations are estimated at roughly US$300,000. These nongovernmental contributions, which were used to conduct the procurements, manage the installations, and assure their viability, were essential to the success of the project.

The Project

Protected areas are national parks, biosphere reserves, and other designated conservation areas where a governing body has officially declared protection of nature to be a priority.

Effective and efficient management of these areas include the sustainable use of available energy resources. Since 1994, international conservation organizations, together with their respective local NGOs, have integrated energy planning into remote conservation and sustainable development activities.

Since 1997, program partners have installed 74 systems, totaling more than 25 kW, which provide critical electricity services for operations, infrastructure, and community development activities in protected areas. Renewable energy projects include PV electrification, PV communication, PV water pumping, and wind electrification.

For example, a PV-powered radio network enables more than 200 coffee producers to mobilize coffee more efficiently. The resulting higher incomes not only benefit these producers and their families, but also draw other producers to more sustainable cultivation practices.

Such projects have generated substantial private- and public-sector replication. For instance, in Chiapas, where a PV system was installed in a reserve, surrounding community residents elected to invest their municipal funds in PV electrification of several hundred rural homes.

Technical Data

PV and wind electrification systems range from 50 to 11,200 W. They power water-pumping and purification activities, communications, scientific and audiovisual equipment, refrigerators, fans, computers, and basic lighting. Most systems are less than 300 W. Three examples follow:

- Three 300-W wind turbines provide lighting and power, and an independent PV system provides water pumping for a ranger station and visitor center on Isla Contoy, an island designated as a bird sanctuary off the shores of Cancun.
- A 1.9-kW PV system pumps stream water over a kilometer to provide 38 families with potable water.
- Four PV systems totaling 1.9 kW provide electricity for a central lodge/research station and three remote cabins in the El Eden Ecological Reserve, where biologists demonstrate the profitability of conservation.

Performance Data

Implementation of the PV and wind systems has given more than 4,000 people dispersed across remote communities access to clean and quiet electricity.

Although the true test of sustainability is time, the high performance of the systems and favorable operator response indicate that the services will continue to satisfy local needs well into the future.

Continual feedback, routine inspections, and word-of-mouth transfer of basic concepts on the installation and maintenance of solar systems and the benefits of renewable energy enhance the likelihood of long-term satisfaction.

Participants and Roles

The partner NGOs, which implemented the systems, are The Nature Conservancy, Conservation International, World Wildlife Fund, Linea Biosfera, Amigos de Sian Ka'an, El Eden

Private Reserve, Campesinos Ecológicos de la Sierra Madre de Chiapas (CESMACH) coffee growers cooperative, Instituto de Historia Natural, and Pronatura Peninsula Yucatán. US and Mexican Implementing Partners were Sandia National Laboratories, New Mexico State University, Winrock International, Enersol Associates, and Ecoturismo y Nuevas Tecnologias. Project sponsors included the United States Agency for International Development (USAID) and the United States Department of Energy (USDOE), and the Mexican Secretariat of Environment, Natural Resources, and Fisheries (implementing partner).

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